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ABSTRACT

This practicum was designed to utilize a shared decision making (SDM) committee model as a mechanism through which a long-range, comprehensive computer technology plan would be developed for a Jackman (Maine) school system. On-site research coupled with an extensive review of current literature produced a finding that long-range technology education planning had not previously materialized in the school due to the ad hoc fashion in which computer technology had pervaded the curriculum. A committee was established utilizing a shared decision making model. All parties with a vested interest were represented in the process. The sole charge to the committee was the development of a comprehensive computer technology plan. The results of the practicum were positive. A comprehensive computer technology plan, which will guide computer budget preparation and curriculum development, was developed and subsequently accepted. Copies of surveys used in the needs assessment, a project timeline, and the completed comprehensive computer technology plan are appended. (Contains 67 references.) (Author/KRN)

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ED 365 287

Utilizing Shared Decision Making in Developing A Computer Technology Comprehensive Plan For a Small, Rural, K-12 Campus

by

William H. Crumley

Cluster 43

A Practicum II Report Presented to the
Ed.D. Program in Child and Youth Studies
In Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

NOVA University

1993

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PRACTICUM APPROVAL SHEET

This practicum took place as described.

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This practicum was submitted by William Crumley under the direction of the advisor listed below. It was submitted to the Ed.D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova University.

Approved:

8/30/93
Date of Final Approval of Report

Barry Birnbaum, Ed.D.,
Advisor

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Abstract

Utilizing Shared Decision Making in Developing A Computer Technology Comprehensive Plan For a Small, Rural, K-12 Campus. Crumley, William H., 1993: Practicum Report, Nova University, Ed.D. Program in Child and Youth Studies. Descriptors: Technology Education / Computer Education / Rural Education / Computer Curriculum / Shared Decision Making / Curriculum Development.

Although computer equipment was available in this rural school setting, there was no plan existing to establish how computer technology was to be used. This practicum was designed to utilize a shared decision making (SDM) committee model as a mechanism through which a long-range, comprehensive computer technology plan would be developed. The single goal was that the school district would successfully develop such a plan.

On-site research, conducted by the writer, coupled with an extensive review of current literature, produced a finding that long-range technology education planning had not previously materialized due to the ad hoc fashion in which computer technology had pervaded the curriculum. A committee, chaired by the writer, was established utilizing a shared decision making model. All parties with a vested interest were represented in the process. The sole charge to the committee was the development of a comprehensive computer technology plan.

The results of the practicum were positive. A comprehensive computer technology plan, which will guide future budget preparation and curriculum development, was developed and subsequently accepted.

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Chapter I

Introduction

Description of Work Setting and Community

The setting of the problem which was the topic of this paper was a small remote border community in the northeastern United States. The problem presented was not unique, nor limited to, that particular geographic situation and, in fact, could occur in a similar rural setting anywhere. In order to appreciate the problem, it is necessary to understand the distinct geographical characteristics of the community and the somewhat unique characteristics of the school involved.

The community in which this practicum took place epitomizes the term "geographically displaced". This remote village with its approximate 1200 occupants, nestled in the boundary mountain region of the state, has the unique distinction of being one hundred miles from anywhere or anything. This includes movie theaters, shopping centers, university campuses, or

fast food restaurants.

For well over a century, this French and English bilingual community has thrived on a dual economic base, logging and tourism. In addition, the community serves as a Port of Entry between Canada and the United States.

Despite its remoteness, the community is not necessarily economically depressed as one might think. Traditionally, unemployment here has stayed around the zero mark, as the ancestral entrenched lumbering and tourist trades continue to produce more jobs than the local labor market can provide. Often, the labor force for the logging industry must be imported from neighboring Canada, to facilitate working the hundreds of thousands of acres of woodland which surround the community. Changing forest management practices in the past decade have eliminated some year-round jobs, but at the same time, this shift has created an additional, labor intensive, seasonal job market being filled largely by migrant Hispanic workers, from a variety of Latin American countries. More and more of the Hispanic workers are starting to take up permanent residence in this unique hamlet, transforming the century-old Franco-American community into a multi-cultural setting.

Historically, the tourism sector of the local economy has thrived on outdoor recreation. Ultimately flowing into crystal clear streams, countless hundreds of pristine ponds and lakes dot the vast woodlands of the region. For over a century this woods and waters combination has provided some of the most lucrative trout fishing and deer hunting in the eastern United States.

Recently however, as fish and wildlife populations have declined due to a combination of many factors, conceivably including poor resource management and degradation of the local environment, the tourism sector has witnessed a shift in its clientele. While fishing and hunting are still an important segment of the tourist economy, today, snowmobiling is "king". In addition, other outdoor sports which do not rely on fish and game populations, such as canoeing, hiking, and cross-country skiing, are locally on the rise.

In short, the area is a remote wilderness with a dual faceted economy, both segments of which are dependent on the local natural resource base for survival.

The focus of this practicum was within an extremely small rural school district. The district serves the educational needs of the community described

above as well as providing services for several "unorganized townships" which abut the district geographically. These unorganized townships are sparsely populated, political sub-divisions, which have no local autonomy, and are managed and governed by the state. The state pays tuition to the school district for these out-of-town students.

The school district is ruled by a seven member elected directorship which meets officially on a monthly basis, and serves the primary function of establishing policy for the school district. The task of budgeting is delegated to the community at large, as the district operates in one of a hand-full of towns remaining in the country which still employ the "town meeting" form of government. Under this system, the entire community is invited to an annual town meeting to set the school budget through a "line item" budget process, that is, each line of the budget is debated and voted on individually. The job of implementing the policies established by the district directors and expending the budget established by the town meeting is placed on a lone superintendent/principal. This single individual performs all of the superintendency duties mandated by state regulation, in short, administrating the school district, as well as fulfilling all of those

tasks typically delegated to a K-12 building principal.

The physical plant consists of one, K through 12, consolidated school building. The building, situated on an eleven acre tract of field and woodland, is divided into three wings - one elementary, one middle-school, and one high school. A central common area consisting of a gym, library, and dining area links the three wings together.

The K through 12 faculty consists of 21 members, six at the high school level, four at the middle school, five at the elementary, and five in K-12 positions. In addition to the faculty, there are normally about a half dozen support personnel working in a variety of roles. Most recently, a new migrant education position has been added to the list of support personnel.

Writer's Work Setting and Role

The K-12 student population within this school district averages around 260 students, with about 25% of those making up the high school population. At the time of this writing the high school student body consisted of 68 individuals, yielding a 1:11 teacher/student ratio.

The typical graduating class averages somewhere

around 15 students, about 50% of whom will go on to some form of higher education. Some of those who do not go on to school remain in the community and become a part of the local work force. In addition, a few of those students who obtain further education eventually return to the community and join the local labor pool.

In short, many of those who attend this school system will, at least for some portion of their career, become a part of the dual economic system described earlier.

The writer constitutes the entire social studies department at the high school level. As such he normally teaches five or six classes per day and fulfills the duties of a department chairperson. In addition, he facilitates curriculum development and the subsequent piloting and implementation of new social studies programs. At the time of this writing, the author is additionally serving as an intern under the mentorship of the Superintendent/Principal.

In the small rural school, faculty members are often called on to "wear several hats". This writer serves as Director of Adult Education, University Inter-active Television (ITV) Site Coordinator, member of the Staff Development Committee, and member of the Student Assistance Team (SAT).

In a typical year, the writer, in the capacity of social studies teacher, will work with about 75% of the high school student population, or about fifty students. Additionally, the writer advises and coordinates college courses for about two dozen adults involved in the ITV instructional program, and provides educational advising for the adult education program.

Within the academic limitations and restrictions of this very small school district, within the narrow scope of the community's economic base and resources, and within the uniqueness of the work setting, lies the educational mission of the writer. It is very appropriate for the writer to undertake curricular planning endeavors which will be both academically rewarding and relevant to the present and future lives of the student body, and beneficial to the school district at large. Hence, this practicum project is undertaken.

Chapter II

Study of the Problem

Problem Description

The problem addressed in this practicum was that there was no clearly defined mission within the school district, as to what role computer technology was to play in the educational life of the students, kindergarten through twelfth grade. Although the problem setting, in this instance, initially appeared to be conducive to the use of technology (i.e., extremely low student/teacher ratio, K through 12 at one location under one roof, and one administrator with no central office to contend with), technology was not being implemented or integrated in any planned fashion.

After an initial review of the context and framework of the local district's educational and instructional strategies (i.e, written curriculum and delivered curriculum), and an extensive review of the current literature on the subject, the problem was

stated and acted upon as: "Although computers are available, there is no plan existing in the school district to establish how computer technology is to be used."

When an entire school district is located under one roof, and an entire faculty numbers fewer than two dozen, one most often has a sense of what is taking place across the hall, around the corner, or at the opposite end of the building. In this instance, it occurred to the writer that the secondary social studies department, consisting solely of the writer, as well as other disciplines, were not integrating or utilizing computer technology as a part of an instructional strategy. Furthermore, the writer had no recollection of any curricular or policy mechanism which specifically encouraged or advocated in support of the utilization of computer technology, either by students or instructors. It was evident to the writer that the faculty, in most if not all instances, were not capitalizing on the promise afforded by computer technology.

In brief, it appeared that even in situations where the hardware was readily available, computer technology was not being utilized as the potentially dynamic instructional tool that this writer believed it

afforded. Why? Computer technology was existing in a curricular vacuum. No mission had been clearly stated, no policy formulated, no goals or objectives set forth, nor any plan developed to guide the faculty along the technological path.

Problem Documentation

Documentation of the absence of any planned utilization of technology across the curriculum was not difficult. A search of written documents, coupled with an informal interview with faculty, proved to be sufficient inquiry tools. A review of the school district policy manual, written curriculum documents, and written course descriptions, indicated a clear absence of the promotion of computer usage, either by students or faculty. With the exception of a brief course description for the introduction and advanced half year computer programs and the keyboarding courses, there was no mention of computer technology usage or application. Whether intentional or accidental, there was an obvious omission of any computer technology discussion.

A poll of the faculty was conducted on a very informal basis, simply by going from faculty member to faculty member and discussing the issue at hand. The

writer's notion about the use of computer technology was confirmed. It was revealed that usage or application of computer technology, outside of very specific computer courses, was almost non-existent. Further, it was evidenced that any substantiative plan to serve as a guide for computer technology usage or to facilitate curriculum development was absent.

In addition to the above mentioned revelations, the writer could uncover no evidence that the school district had complied with a state mandate requiring the development of standards for computer literacy, computer proficiency, and performance levels for high school graduation. In short, the school district did not have any type of a formal, written, comprehensive plan which would delineate the role of computer technology in the K-12 curriculum.

Causative Analysis

A formal instrument or research tool to pinpoint the cause of the stated problem was not developed, nor was it deemed necessary in this unique setting. The writer chose instead to use an ongoing dialog with the faculty, administration, district directors, and community members to ferret out the reason for this obvious planning omission. The results of the probe

indicated that there were four obstacles standing in the path of any prior resolution to this problem.

First, computer technology possessed no autonomy as a distinct or separate discipline either within the formal K-12 curriculum, or the school district as a whole. As it occurred in many small schools, computer instruction entered the curriculum "through the back door", as an adjunct component of the mathematics department. Several years later, additional computers were added as replacements for electric typewriters in the business education department. Additionally, special education made several computer purchases and outfitted the hardware on roll-around tables to accommodate the requirements of special needs students. In short, there was no computer department, no technology coordinator, and, as previously mentioned, no formal plan.

Second, it was apparent from the ongoing dialog between the writer and the faculty, that a majority of the faculty members were not, by any measure, computer literate. It was further evidenced in the conversations that many of these educators possessed a negative attitude toward computer technology, which translated into a negative predisposition toward computer use, either by themselves or their students.

Third, the extreme geographic displacement of this community and work setting had created a policy environment - a public mindset - not conducive to technology related education. Entering this community is in many ways like entering a "time warp". There are no automatic teller machines for banking, no bar code scanners at the grocery store, and no computerized engine analyzer if your car is running rough. Hamburgers are still patted out by hand and cooked on a grill. In short, despite the presence of satellite dishes and fax machines, the community was low-tech. While this lifestyle has its benefits, the reality of the situation is that, for the most part, the community neither understands the role of computer technology in mainstream America nor the role of computer related education.

Fourth, prior to the present school administration, there was a consistent lack of continuity and instructional leadership where administration is concerned. It would take two hands to count the number of superintendents in the past decade alone. Both curriculum and instruction muddled along, thanks to some dedicated faculty members, on a day-to-day or at best a year-to-year basis. The situation was analogous to the ancient adage of a ship

with a crew but no captain at the helm. No clear course was charted. Educational technology, particularly computer technology, was allowed to remain a latent issue. That situation has recently reversed, however, as the present administration has allowed the subject to surface.

Relationship of the Problem to the Literature

In the short history of computer technology education, in the few years since this state had passed a "computer literacy" mandate, much professional discussion had been conducted regarding the significance of a well planned, computer technology education program. Studies found in the research were convincing as to the benefit of a planned approach when implementing computer technology in education, and the studies were equally revealing as to the pitfalls and problems associated when computer education occurs in a curricular vacuum.

In documenting the existence of the problem while advocating for educators to plan well and keep informed about the age of computers, Young (1984) related what were called "historical nightmares...horror stories" (p. 45) of unopened computers sitting in schools because no one knew how to use them or what to do with them.

Even more alarming, according to the writer, was a fear on the part of some educators, that computers would be misused by unskilled students, causing the computers to remain safely in storage rooms.

Citing the results of one school district's technology needs assessment, Wilson (1992) presented findings showing that of 1500 individuals surveyed, including faculty and students, many potential users had no idea of what technology, including computer technology, was capable of doing for them. Teachers surveyed were reluctant to provide input about technology education or become turned on to technology applications due to their own lack of knowledge, according to Wilson.

Johnson (1992) bore out the vital importance of technology education because computers have virtually become ingrained in our culture. Johnson indicated the importance of creating a district computer technology plan as opposed to adopting a general model, because computer education needs are not generic. Computer education objectives differ from district to district, according to Johnson, prompting the necessity for both developing and implementing an individualized plan.

Charting the computer background of freshman

entering college, Harrington (1990) discovered that the mere presence of computers in a high school setting says little about what, if any, access students have had to the computers. While the research indicated that virtually all high schools possess computers, their was an obvious discrepancy when student computer experience was queried. In short, despite the presence of computers in schools, students are sometimes being turned out of the educational system lacking computer literacy according to the research. Harrington merely discussed emerging patterns and did not target a culprit, nevertheless, the reader was drawn to conclude that a lack of planning was involved in educational situations where the computer hardware was in place and students were not getting the hands-on experience.

Decrying a decade of often unsuccessful attempts at computer integration, Pritchard and Busby (1991) believed that many educational institutions had failed to properly integrate computer technology education into their curricula. The researchers confirmed the lack of success experienced by many school districts in integrating technology into education, and highlighted the importance of a school district's development of a plan for technology integration. The writers cited two possible causes for the current planning void existing

in many schools today - financial accountability and an absence of strong leadership. Simply stated, the pair reasoned that, first, technology is very expensive and many institutions don't sense the cost/benefit connection and second, that technology is normally advocated for by a small group of enthusiastic individuals. What was needed, according to the two researchers, was strong top-down leadership for the planning and implementation process.

An article by Benson (1991), written about a rural school district, confirmed the notion that some small schools were not meeting the educational computer needs of students. Benson reported that this particular rural school district did not adequately provide student access to computer technology. Apparently the rural district depicted in the article was one more detrimental example of the absence of technology planning. Benson suggested a remedy for the curricular situation in long-range computer technology and staff development plan which would take the school district into the 21 st century.

Scrutinizing American high schools after a decade of attempts at reform, Cawelti (1989) alleged that large numbers of high school graduates did not possess the proficiencies needed for entering college or the

work place. As with other writers and researchers, Cawelti's solution involved long-range planning, especially where technology is involved, which led back to the presumption that lack of planning was the problem. Cawelti singled out technology as one of the first and foremost problems to be dealt with by educational planners.

Ogle (1991) reported computer education figures made available from a U.S. Department of Education 1987 high school transcript study. The findings indicated that despite significant gains in recent years, American students were, on average, still not obtaining the minimum computer science education recommendation set forth by the U.S. government in A Nation At Risk (1983).

As a result of researching current trends in technology, White (1989) claimed that many people complain that teachers do not use educational computer technology enough. Education had fallen behind other work settings in the application of technology according to the writer. Inferring a possible problem in planning, White believed that technology had been mismatched with the educational curriculum. This mismatch was reinforced by the standardized testing process which often drives the decisions of planners

and the methods of teachers.

Barnhart and Barnhart (1983) had used Alaska as a laboratory to observe long standing problems that confront rural educators, including educational technology issues. The pair concluded that technology in the small rural school can be costly if not implemented in a well planned fashion. According to the writers, proper planning is a prerequisite to the use of technology in the rural school.

Attempting to measure the efficacy of computer education, which had entered the third decade of classroom presence, Bozeman and House (1988) reported dissatisfaction and disagreement among educators concerning computer usage. Noting that over one million computers are in classroom use, the researchers indicated that the computer implementation process had often occurred in a vacuum, void of long range planning, creating a significant problem.

Examining the quandaries encountered by small rural schools in delivering quality curricula for their students, Nytes and Musegades (1985) viewed the problem of integrating technology into the classroom as the "major problem facing education...today for schools of all sizes" (p. 34). As with the findings of other researchers, this pair led the reader to conclude

that a lack of hardware is not necessarily the problem, it is a lack of planning. The writers indicated that educators often do not put forth the necessary effort to fully capitalize on available technology, probably because of the absence of long-range planning.

Probably best summing up the problem at hand, the American School Board Journal (1988) concluded that the question was no longer if schools would have computers, but how they would use them. In the view of this writer, only a well thought out and properly implemented comprehensive technology plan can answer that question and address the problem.

The findings of the literature documented similar problems and suggested possible causes surrounding ad hoc or unplanned computer education programs. Woodrow (1987), researching educator's attitudes toward computer usage, indicated that, "lack of knowledge of computers is one of the main barriers against the widespread use of computers in schools" (p. 27). Woodrow further submitted that while changing curriculum content is a relatively easy task, changing the teaching behaviors and attitudes of educators is more difficult. Simply stated, many educators themselves need an awakening as to the potential of computer technology.

Atwater (1990) viewed a very specific target group, secondary science teachers, in an effort to suggest how best to utilize computers in the science classroom. The research conducted by Atwater indicated that most teachers just don't know what to do with a computer in the classroom. The writer offered statistical evidence which indicated that only about seven percent of high school science classes are using computers for instruction. The research showed that at the lower elementary level the figure drops to about one percent. Atwater concluded that science teachers are more-and-more interested in integrating microcomputers effectively into the classroom, but problems linger. Although teachers have bought in to the technology concept, however, the question for most teachers is simply how to get started. Teachers just don't know how to effectively integrate computer technology as an instructional tool, especially in K-12 science settings.

O'Brien took a psychological approach to studying the computer education issue, including a historical overview of the development of American education. According to the writer, reform efforts of the last twenty-five years have caused a spin-off effect pertaining to computer technology education.

The researcher offered the hypothesis that some skeptical educators may view computers and computer technology education as one more addition to a long "parade of fads and bandwagons" (p. 33) in education, thus making them reluctant to join in.

Swanson (1988) looked at the potential that technology offers to the rural school and concluded that technology can be the savior of curricular integrity. The problem for rural schools, however, which Swanson has uncovered, is that rural folk generally view "high tech" with skepticism making implementation difficult. A genuine paradox exists in this instance. Rural areas possibly have the most to gain in education from technology, but they are the most reluctant group to endorse the instructional strategy.

Maddux (1989) described the possible connections between overly optimistic claims about the value of computer technology in education, and examined the factors that have prompted those assertions. The researcher uncovered a major dilemma in the inability of practitioners to agree on exactly what "computer literacy" was. Additionally, Maddux indicated that there was little consensus as to what skills and knowledge were requisite in developing computer

literacy, and further stated that this topic had been controversial for years, without resolution. In plain language, there is as yet no general agreement among educators as to what students should or should not be doing with computers.

White (1989), having looked into the issue of why teachers were not utilizing computers, alluded to the measurement-driven instruction phenomenon. White's findings indicated that computers are not subjects found on standardized achievement tests. Therefore computers do not get comparable curricular attention as do the tested subjects.

Summers (1988), sought input as to why professional educators were not using computers, through surveying a group of freshman students in a college of higher education. Three quarters of these future teachers reported little to no previous experience on computers. Forty percent of the students completing the questionnaire entered higher education with negative feelings about computers. With research findings such as this, it is not difficult to perceive why computer education is in a state of flux and further, why planning is essential.

Lindbeck and Dambrot (1986), Widmer and Parker (1983) and Payne (1983) discussed and confirmed the

existence of computer phobia and computer anxiety among educators. The sum total of the research findings was that many educators are reluctant and even afraid to experiment with computer technology despite the potentially valuable instructional strategy computers can offer.

The literature reviewed by the writer was not limited to the subject of the importance of planning in computer education, but included many associated computer technology issues such as multimedia, telecommunications, computer assisted instruction, distance education, computer applications, to name a few. Additionally, curriculum development, school reform issues, problem solving, site-based management, shared decision making, and other planning related topics were explored.

The base of literature available on the topic at hand is large, to say the least. There clearly exists ample evidence to substantiate the necessity of well thought out, comprehensive, computer education planning. Conversely, there exist numerous rationales to explain why this planning has often not occurred in the past, and is still not occurring in some instances today.

Chapter III

Anticipated Outcomes and Evaluation Instruments

The following goals and outcomes were projected for this practicum.

Goals and Expectations

The writer had one goal in mind, that being that the school district would develop and implement a long-range comprehensive technology plan.

Expected Outcomes

The writer proposed the following specific outcomes as a vehicle toward realization of the stated goal. Inclusion of a mechanism which will facilitate each of the stated outcomes, within the completed comprehensive computer technology plan, would constitute a successful implementation.

* A class-to-class formal observation will reveal that all teachers have been supplied with a computer, and are utilizing same for non-instructional components of their job.

* A class-to-class formal observation will reveal that all classrooms are equipped with a minimum of one computer for instructional purposes, and that computer technology is utilized and encouraged in all appropriate programs.

* A formal review of teacher lesson plans and student enrollment records will substantiate that all elementary students are receiving a minimum of one hour per week of computer instruction, and all secondary students a minimum of one-half hour per day of hands-on computer time.

* A review of written curriculum will indicate that wherever feasible and appropriate, computer technology has been integrated as a curricular, instructional strategy.

* A review of graduating student transcripts will indicate that all graduates have participated in classes which expose the student to the computer skill of keyboarding, as well as the computer applications of word processing and telecommunications.

* A review of staff-development attendance records will substantiate that all teachers have participated in a computer staff development program, at their individual level of proficiency.

* A review of the computer education written

curriculum will show that "computer literacy" has been clearly defined in accordance with the state mandate.

Measurement of Outcomes

Because the goal of this project was singular and straightforward - the development and implementation of a long-range comprehensive technology plan - a specific evaluation instrument had not been designed and was not deemed necessary. Instead, the evaluation process utilized the following vehicles as measures of goal and outcome success.

The Comprehensive Computer Technology Plan underwent a formative and summative evaluation (see Appendixes A and B for evaluation instruments). Initially, this document was reviewed by the writer during the developmental phase to both insure the inclusion of the goals and outcomes as stated previously and to to insure consistency with the stated strategy. Secondly, the writer conducted a summative evaluation after the implementation period to insure that the plan was congruent and consistent with the goals and outcomes described. Finally, an ongoing dialog was maintained between the writer and those individuals directly related with the implementation process, providing a verbal type of evaluation. Simply

stated, these three evaluation tools, in concert with one another, served the function of measuring the program's success at meeting the goals and outcomes as set forth on the preceding pages.

Chapter IV

Solution Strategy

Discussion and Evaluation of Solution

The problem at-hand was that although computer equipment was available, there was no plan in existence to establish how computer technology was to be used. Contemporary writers and researchers had provided much insight into possible solutions towards the successful development of a Computer Technology Comprehensive Plan. A preliminary review of the literature revealed Johnson (1992), Wilson (1992), and Benson (1991) demonstrating the importance of strategic planning in successfully implementing educational computer technology. The trio of writers shared at least two common links through their works - first, the importance of a long-range plan for educational technology within the individual school, and second, the significance of a committee structure in developing such a plan.

Additional literature bore out the necessity of a well thought out, comprehensive technology plan. The consensus on this point was unanimous. Not one article was found that dismissed the fundamental significance of comprehensive long-range planning in a program of educational technology. Three models or solutions were presented as potential vehicles for developing and implementing such a plan.

Nytes and Musegadesp (1985) discussed the importance of technology in the small rural school, while decrying the enormity of the problem when such schools attempt to integrate technology into the classroom . The pair of researchers suggested a "technology cooperative" approach to resolving the problem. In this, the first of the three problem solving paradigms uncovered through the literature review, rural schools could, according to the writers, both plan together and ultimately enter into joint technology agreements. Thus, the small school may reap benefits offered by the economy of scale, normally only accessible to larger organizations.

As a second suggested scheme for solving the technology plan development and implementation dilemma, and in a definite minority among the researchers presented in this paper, comes the paradigm of

Pritchard and Busby (1991). This pair of writers provided a model for implementing school district technology planning, which advocates for strong top-down leadership while discounting the use of a committee or cooperative structure. While acknowledging the efforts of that typical small group of creative and concerned individuals, enthusiastically advocating for technology integration at so many educational institutions, the pair felt that assertive top-down leadership was vital and requisite to the success of any technology program. In the opinion of this writer, the notion of this pair of researchers is that administrative dictate is the appropriate problem solving apparatus.

A third and final model for developing and implementing a technology plan received overwhelming endorsement throughout the literature and was represented in the writing of Wilson (1992). This design prevailed upon a local committee structure as the appropriate device for solving the technology problem. Wilson advocated for a technology plan with a "totally integrated technology solution" (p. 6). Such a plan would, in addition to computer education, include technology application areas such as student records, instructional management, and information-

management services, to name a few. Wilson cited the importance of a committee structure, which would utilize input from students, faculty, and community members as well, in formulating a technology policy.

Bozeman and House (1988) concurred with other researchers that a lack of planning has been a part of the technology problem. The pair presented research to show that many educators erred in the actual implementation process of computerization because they did not properly undertake long range comprehensive planning. In encouraging educators and planners not to be discouraged by prior mistakes, the pair stressed not only the significance of planning, but even more importantly, the creation of a workable evaluation paradigm for evaluating the implementation of such planning.

The literature abounded with support for development and implementation of technology planning as well as support for utilizing a committee structure as a means to that end. Additionally, writers suggested various components or processes which might aid in achieving the goal.

Finkel (1992) explained the necessity of a school district's comprehensive technology plan which would "provide general guidelines to schools, while at the

same time demonstrating a long term, well funded committment to the use of technology" (p. 14). While discouraging planners from including specific hardware and software brands in a plan, Finkel added that a plan might include items such as staff development, funding, support services, and leadership.

Lauda (1989), stressed the need for school technology planning, and pointed out that, "If we are to restore the competitive edge of our society and prepare people to face the mandate of a technological society, learning for life in a technological society cannot be an incidental activity - It must be consciously planned and implemented" (p. 3).

Decrying futile efforts throughout the United States to bring computers into schools without proper planning, Tesolowski, Kurth, and Kaufman (1988) offered a model for the development process of a comprehensive computer plan for a local educational agency. The writers suggested components which might be included in such a plan including philosophy, goals, objectives and staff development. Furthermore, they stressed the need for not only planning but a strong evaluation strategy.

While not specifically addressing the issue of computer technology planning, Schlechty (1991), Tewel (1991), and Strauber, Stanley, and Wagenknecht (1990)

all supported usage of a shared decision making (SDM) model in the planning and development of school reform issues such as the one at hand. Use of such a paradigm insures the inclusion of all stakeholders - all parties with a vested interest - in the planning phase.

Along with many researching counterparts, Johnson (1992) affirmed the absolute essentialness of strategic technology planning. While agreeing wholeheartedly that technology objectives may be different from school district to school district, Johnson submitted that there are general steps which should be considered when developing a comprehensive computer technology plan.

Several of the articles and research findings reviewed offered curricular models for technology implementation at various developmental stages and educational levels. Such research can be valuable to a committee charged with formulating a comprehensive technology plan.

Jansen (1991) described "teaching and learning with computers (TLC)", a technology integration model which can be successfully and effectively integrated across the K-6 curriculum. This relatively new approach which draws on three types of learning activities - seeing, hearing, and touching, can put the

"fun" back in the classroom according to the author.

Zorfass, Remz, and Persky (1991) furnished a planning model for technology integration at the middle school level. The model consists of three components as follows: First, a curriculum component through which teams of teachers collaborate to integrate computer usage into a six-to-eight week curriculum unit. Second, a teacher development component by which resources and guidelines are furnished to collaboratively and collectively develop the teachers capacity to utilize technology. Lastly, a facilitation component which would encourage the principal to provide instructional leadership. This "Make It Happen" prescription, as it is called, "provides an easy to follow model...for teachers...to work together and achieve a curriculum that fully integrates technology" (p. 71).

Unfortunately, at least in the view of this writer, secondary schools are still entrenched in the notion of distinct disciplines and departmentalization. A totally multidisciplinary high school model is not the norm. Instead, high school models for technology integration are more often targeted at a specific subject area. For example, Fitzgerald (1992) had developed a computer integration model for a high

school industrial technology program. Fitzgerald stressed that the important facets of a high school technology curriculum are that it be both current and relevant. The model must be flexible. Fitzgerald encouraged educators and planners to stay abreast of our changing world and to revise the high school technology curriculum as needed.

Although several models are available to guide educational technology planners, some practicing educators are not prepared to readily accept those or perhaps any other models. Dwyer, Ringstaff, and Sandholtz (1991) cautioned planners about this realization. The trio of researchers validated the importance of changing the beliefs of skeptics or, stated another way, having teachers buy-in when computer technology is added to the classroom. The three concurred that in introducing or implementing technology education, "instructional change can only proceed with a corresponding change in beliefs about instruction and learning" (p. 52). They concluded that without this vital prerequisite, the implementation process might be both frustrating and inconclusive.

Despite the pitfalls and obstacles muddling the path of a conscientiously executed technology education program, the literature is abounding with success

stories at every level of education. Two articles in particular, Couch and Peterson (1991) and Benson (1991), stood out as model success stories demonstrating what results can be achieved when a small K-12 school takes on a technology commitment. The former of the two articles related how parents, local community, and faculty collaborated and developed a high-profile approach to educational technology, yielding five years of continued technological success and growth. In the latter of the two findings, the writer documented how one small school, with a very modest start, and in the space of three years, produced what were termed unbelievably positive results. In both instances a collaborative planning effort appeared to be the key to success.

In support of such collaborative efforts, several educational technology researchers offered a caveat to perspective planners, that is, that there exists a definite link between technology planning, staff development, and curriculum development. This intertwinement mandates that none of these components be undertaken in a vacuum, but instead be conscientiously planned and implemented in concert with one another. Cawelti (1989) singled out technology, curriculum, and staff development as the primary

ingredients in designing schools for the future.

Dede (1989) reflected upon the implications of technology education on the curriculum and suggested that schools must change and update their curriculums to reflect more closely the vast changes technology is making in the work place . The writer went on to explain that as the American job place changes, so must our schools change, and submitted that conceptual and organizational barriers often stand in the way. Finally, Dede argued that schools must begin planning the use of these emerging technology tools if education is to have a bright future.

Revenaugh (1989) upheld staff development as the "cornerstone of any school program to integrate computers into curriculum" (p. 20). Revenaugh cited the findings of other researchers and concurred that the secret to insuring the success of any technology program is found in the source. In short, teachers must be a part of the planning phase and subsequently, teachers must be offered professional development opportunities so that they can facilitate the implementation phase. The results of this type of planning are 100 times more productive in the words of the writer.

Schlumpf (1991) related the teacher empowerment

phenomenon that is spurred whenever proper staff development is combined with computer integration. Citing a specific example, the author described how teachers at one school district were furnished both with a computer for personal productivity and with a program of training. Tangible results followed. Within one year, about 92 percent of the teachers were actively using the computers. Schlumpf concluded that, "If we, as a society, believe that our children need the power and flexibility that computers offer in order to be empowered...then it is our responsibility to provide that same capability to those who teach our children" (p. 82).

Harrington (1990) explored the question often faced by technology planners as to what constitutes "computer literacy". Harrington discussed a current high school educational trend which shows a pedagogical shift away from the instruction of computer programming, and toward what are seen to be more practical and useful computer technology applications. According to the researcher, students who report programming as their only computer experience can not be deemed computer literate. Without giving a precise definition of the construct, Harrington alludes to a rationale that computer literacy involves the ability

to manipulate productive software (e.g., word processors, spreadsheets, file managers, etc.).

The findings of Bengtsson (1992) researching in Sweden, Sanchez (1991) researching in Latin America, and Kiselev (1992) researching in the former Soviet Union all appeared to concur with the aforementioned work of Harrington (1990). The global trio of researchers all reported research findings which showed a worldwide curricular trend in which computer education is drifting away from programming, replaced instead by instruction involving the application of productive software.

Innumerable additional research findings were reviewed by this writer. Various authors lent credence to the notion that computer education can and should perform a curricular function in the small, rural K-12 school. The articles reviewed discussed the trends in computer education, provided examples of successful computer usage at all grade levels and in all disciplines, and suggested elements and applications that might be considered as part of a comprehensive computer technology plan.

Holmes (1990), Ray (1988), Barnhart (1984), and Hobbs (1985) depicted rural school settings in Minnesota, Maine, Alaska, and Utah where computer technology is

currently being successfully integrated to enhance curricular parameters and improve instructional strategies. All of these findings added credence to the potentially successful implementation of a planned computer technology program in the particular work site of this practicum project.

A sampling of the K-12 grade level successes include the following:

Guddemi and Fite (1990) advocated that computers have a legitimate place in Kindergarten or early childhood classrooms. Their research indicated that word processing and writing, on a computer, can start at this developmental level, and that children will view the computer as one more playground, instead of work.

Cauthen, (1990) had developed a mathematics program suitable for use in Grade 1, and possibly even Kindergarten, according to the author. To those critics who claim that this instructional style is not age appropriate, the article retorts that "young children are very interested in computers and are capable of solving some complex problems" (p. 1).

Guss (1990) provided a lesson plan for integrating computers into a second grade mathematics program. Similar computer assisted mathematics instruction

programs had been created by Cartwright and Wallace (1990) for Grade 3, Gee (1990) for grade 4, Lindsey and Pitts (1990) for grade 5, and Glidwell and Johnson for Grade 6. All demonstrated successful computer applications at the elementary level.

Little (1991), as well as White (1990), each demonstrated how computer data base applications can be applied in the upper level social studies classroom to enhance the higher order thinking processes, and simultaneously develop and enhance computer skills. Likewise, Knorr and Levins (1990) and Podany (1990) discussed uses of the computer in science classes. The researchers reported the potential for science classes where learning is fun and attractive and students who are motivated for scientific inquiry when computer technology is introduced in the classroom.

Wiebe (1990) provided a demonstration lesson as to how the secondary mathematics instructor might successfully use "metric logo" in a computer assisted math lesson. In both discussing similar computer mathematics success and echoing the National Council for the Teachers of Mathematics, Verderber (1990) called on mathematics teachers to 'take full advantage of the power of...computers at all grade levels' (p. 45). Verderber insisted that spreadsheets are a viable tool

for problem solving, in algebra through calculus classes. According to the writer, spreadsheets offer an alternative to the traditional written method of problem solving and can be readily taught to students with no programming experience.

The literature reviewed included several articles which substantiated that educational computing need not be limited to computer classes or "hard core" academic subjects. Bevins (1990) discussed the successful integration of computer education technology into a home economics program. Likewise, Davidson (1990) discussed the application of computer technology in a music education program. Answering critics who have challenged the use of computers in music composition, Davidson responded that with the assistance of a computer, students can not only learn but, also, discover important musical relationships and concepts for themselves. The writer concluded that the computer in the music program became a "tool" in the hand of the student for "exploration", "verification", and confirmation" (p. 48). Similarly, Sanbury (1990) described potential computer technology applications in an art education program for gifted students.

Grandgenett (1991) traced the startling rate of advancement which technology education has undergone

in the past decade and suggested avenues in which computers could be utilized in mathematics programs for gifted students. The writer briefly discussed implementation guidelines for applications such as LOGO, computer-aided design, multimedia, and numeric processing, to name a few. Similarly, Jones (1990) reviewed the role of the computer in the education of gifted students and concluded that the computer becomes an "idea engine" for such students. Jones also noted that students are working "smarter...developing higher thinking level skills" (p. 1) when computers are introduced.

Majsterek (1990) and Fitzgerald (1990) examined the potential role of computer technology in the education of special needs students. Majsterek zeroed-in on word processing and keyboarding, and discussed the pros and cons of computer utilization with Learning Disabled (LD) students. The writer concluded that although there are mixed findings among researchers, word processing is a valuable tool with LD students if certain prerequisites are met. Fitzgerald, coming from a different perspective, advocated the use of computers with special needs students possessing emotional and behavioral disorders. Fitzgerald reasoned that computers can ignite certain inherent motivational

powers for these special needs students. Furthermore he stated that the special education teachers should follow the lead of their zealous students and enter into the exciting computer environment.

Trotter (1990) described how educators can use computer technology in accomplishing routine, non-instructional tasks. Among the examples cited by Trotter was a program specifically designed to assist the educator through the Individualized Education Plan (IEP) development process. The writer viewed such "expert systems" as tools which will cut down or reduce paperwork in the professional life of the teacher. Additional articles suggested educator task oriented applications such as record keeping, electronic grade books, test makers, and a host of other ideas by which computer technology might make professional life a bit easier and more efficient.

Barbour (1989), similar to several researchers cited earlier in this paper, cautioned the potential technology planner that any proposed curricular computer application, no matter how well intentioned, is dependent upon the support of the teachers who will implement such action. Teacher involvement in the planning phase is vital to the success of the program. The writer went on to explain that any new approach in

education which is imposed from the top-down normally faces failure. According to Barbour, leadership and ownership, of and by the faculty, are the key ingredients for success in implementation. Empowerment is crucial reiterated Barbour. In short, the best laid computer technology plan is likely to go astray, if those charged with the implementation have not been a part of the planning and development process.

As a final caveat to all of the research cited in the preceding pages, the writer asserts an admonition offered by Adkins (1989). Adkins quotes Megatrends author John Naisbitt cautioning that, "the accelerating pace and complexity of modern life is upsetting our balance...technology [doesn't] tell us what it means to be human" (p. 16). There is no question that technology has a viable, and probably unimaginable, role to play in today's school, as well as the school of the future. Even the skeptics must agree that, because of technological innovation, the school of the next century will neither look nor function like the school of this century. Planners must view technology as a tool, and must keep the humanistic factor in mind when applying this tool.

The scores of examples and findings presented above are not atypical of the entire body of literature

reviewed by this writer. These examples, without exception, lend much insight into valid models that are applicable in this particular practicum situation. In addition, this collection of ideas opens the door to countless modifications or spin-offs that might be successfully incorporated. Furthermore, the hundreds of articles reviewed have stimulated this writer to use his own initiative and creativity in exploring subsequent ideas which might be integrated into an overall solution strategy.

The very strong suggestions of many of the researchers, coupled with dramatic success examples presented, bore out the necessity of utilizing a committee structure with a representative composition of all "stakeholders" in the planning and development of any technology plan. Along that vein, the literature stressed that those who will be charged with the implementation - the educators themselves - must be an integral part of the planning phase.

The need to provide staff with adequate professional development in computer technology, or stated another way, to provide teachers and administrators with their own individual computer experience portfolio, has been evidenced in much of the literature as a vital prerequisite to curricular

implementation of technology education. Obviously, if those charged with delivering the curriculum are themselves not comfortable with the tools involved, the implementation is not likely to yield success. To that end, it is essential that technology planners include a staff development component as a significant part of any comprehensive technology plan.

Additionally, much evidence has been witnessed as to the potentially positive impact computer technology offers to individual educators and the education system in non-instructional capacities (e.g., organizational functions, test construction, grading, record keeping, etc.). It might be advisable to planners not to overlook this non-instructional component in designing the framework for a comprehensive plan.

Finally, in this particular work setting or in any similarly rural, geographically isolated location, technology planners may want to include a community education component as a part of both the planning process and the actual plan. Paradoxically, and as the literature has borne out, technology can perform wonders by expanding the breadth and depth of the curriculum in the small rural school. Hi-technology can become an academic equalizer even though rural populations are generally not as hi-tech as their urban

and suburban counterparts. In short, community education may be a vital link, a requisite component in achieving local acceptance of any tendered plan.

Description of Selected Solution

It was apparent to this writer, that the obstacles which presented themselves as stumbling blocks, deterring the transformation of what existed in this small rural K-12 school to what was a desirable situation, were not insurmountable. Development of a Comprehensive Computer Technology Plan could become a reality in this work setting.

A committee chaired by the writer was to be authorized by the local school district officials and subsequently formed. The writers role as chairperson would be facilitative, guiding the process along and providing input based on both the literature review already undertaken, and additionally the writer's "work place savvy", acquired by virtue of having lived in this unique community setting for two decades. To further assist in the development process, technology and education "experts" were to be utilized in an advise and consult fashion, both by the writer and the committee.

The charge to the committee was to be singular and

straightforward - the development of a long-range computer technology comprehensive plan including the following components:

* The completed plan would include a minimum standard definition for "computer literacy".

* The completed plan would be constructed in such a way that it could serve as a guide both for those responsible for curriculum development and those responsible for budgeting and purchasing.

* The completed plan could make other recommendations as the committee deemed necessary.

As a maximum time frame, the committee was to complete its task in one academic year. Beyond that phase, the committee would not be charged with implementation of the completed comprehensive technology plan, but would serve in an ongoing formal oversight and evaluative capacity throughout the implementation process. The final task laid upon the committee was to share and disseminate both its findings and ongoing results with others interested in this planning project.

Such a program as outlined in the preceding paragraphs would actualize the goal and associated outcomes as set forth earlier in this paper. In the opinion of the writer, the solution presented was

destined for success for four very obvious reasons. First, the committee would be formulated using a "shared decision making" (SDM) model. Composition of the committee was to include representation from all three faculty levels, elementary - middle - and secondary, school administration, school district directors, adult education, and the community-at-large. Second, all committee members involved would have a vested interest and a sense of ownership in the completed plan. This hopefully would produce a "halo effect" insuring success. Third, the undertaking of this planning project had the support and encouragement of the district school board directors and administration, faculty and staff, students, and the community at large. Fourth, computer technology education would acquire autonomy as a discipline, as well as being formally integrated as an instructional strategy tool throughout the curriculum.

Report of Action Taken

Action taken by the writer to implement this practicum included the following:

* The writer was officially delegated, by the school district directors, to formulate and chair a computer technology planning committee. The writers role as chairperson was facilitative, guiding the

process along and providing input based on both the literature review already undertaken, and additionally the writer's first-hand experience with the work setting, acquired by virtue of having lived in this unique community for two decades. To further assist in the planning process, technology and education "experts" were utilized in an advise and consult fashion, both by the writer and the committee.

The lone charge to this newly created entity was to develop a long-range comprehensive plan which would serve as a guide for future budget and curriculum development. Total discretion as to how the committee was to be formulated and how the process would proceed was left to the writer. The single stipulation imposed by the mandate was that the time line for the project was not to exceed one academic year.

* Keeping in mind that the committee structure was to follow a shared decision making model, a list of potential representatives was formulated by the writer. Interviews of this collective group were conducted to determine interest and aptitude for service on this committee. At the sole discretion of the writer, who would facilitate the committee as chairperson, the list was narrowed to nine individuals who along with the chairperson would constitute the official committee.

The make-up of the committee included members of:

- the elementary school faculty (1)
- the middle school faculty (1)
- the high school faculty (2)
- the adult and community education department (1)
- the school district board of directors (1)
- the superintendent/principal (1)
- the community at large (2)

* A project time line (see appendix C) was prepared by the writer and presented to the committee-at-large as the first official order of business. This was deemed to be a vital necessity due primarily to the time constraint imposed in the original committee mandate of the school district directors. The time line divided the planning implementation into eight monthly objectives, building upon each other, toward the goal of a fully developed computer technology plan. The proposed time line was accepted without alteration.

* A needs assessment was next conducted. This process of identifying the needs of the school district consumed the first two months of the committee's efforts. The needs assessment process proceeded through a division of the committee into three sub-committees, each with a separate target group to poll. To facilitate this process, three distinct assessment

instruments were prepared by the various sub-committees and then revised and approved by the committee-at-large. The three instruments included:

- faculty survey (see Appendix D)
- alumni survey (see Appendix E)
- potential employers of school district graduates survey (see Appendix F)

Each of the three sub-committees was responsible for distributing and collecting the needs assessment instruments from there respective target groups.

The faculty survey polled not only teaching faculty members, but also, all support staff members including teacher aides, library aides, administrative staff including secretaries, as well as, custodians and kitchen staff. The rationale for this district wide, all-inclusive, employee survey was that the yet to be developed technology plan might include a component addressing non-instructional, administrative uses of computer technology.

The alumni survey queried all high school graduates from the school district within the preceding five years.

The potential employers of school district graduates survey questioned approximately seventy-five businesses within a one hundred mile radius of the work

setting. Those employers selected represented a cross-section of the business and industrial community in both size and scope of operation.

The writer's role in this needs assessment process, as the chairperson, was to coordinate the efforts of the sub-committees, in short, keep the three groups on task and on time.

* Fact finding followed collection of the needs assessment instruments. Through this fact finding process, the results of the needs assessment surveys were tabulated by the three sub-committees and then analysed by the entire committee. The writer served as the facilitator for this process.

* Based on the fact finding results, the writer led the committee through a procedure of problem identification. This problem finding process sought to seek out the discrepancies between what currently existed in the school district (i.e., the delivered curriculum) and what was desirable in the school district (i.e., needs assessment results). This process necessitated the collection of a complete inventory of school district technology equipment as well as a comprehensive review of existing curricula.

As a caveat to the problem identification process, the writer would note that it was this juncture which

was the most trying for the committee and the chairperson. Personal biases seemed to be the rule and not the exception as many independent agendas surfaced. Over time and much debate, however, the chairperson was able to facilitate a consensus yielding a list of sixteen problems (see Appendix G, Chapter V). On the positive side, the difficult step of coming to consensus over the problem identification docket, bred a cohesive committee for the remainder of the planning process.

* A brainstorming marathon, labeled in the time line as "idea finding", followed the problem identification process. Through several work sessions the committee-at-large generated potential alternative approaches to the problems-at-hand. This particular segment of the committee's work was intentionally candid and unrestricted. Committee members were encourage to offer ideas no matter how implausible or "far-out" the ideas seemed.

To aid in this idea manufacturing process several committee members as well as the chairperson made trips to visit other similar educational settings and view the technology programs in place, first-hand. Additionally, the chairperson reproduced appropriate segments of technology plans in place throughout the

state and disseminated those to committee members for reference.

Overall, the writer's role as committee chairperson was facilitative throughout the idea finding process, that is, to keep the collective creativity of the group flowing and allow the idea generation to proceed.

* The final step of the planning phase of this project was the actual finding of solutions. During this step, specific goals and objectives were targeted, matching individual problems with a distinct solution idea recommendation. It was at this juncture that the advice and recommendations of outside professionals was most helpful. Additionally, the literature previously reviewed was a primary aid in the solution finding process.

The writer's role at this stage was twofold - first, to lead the committee through this, the most vital step of the planning process, and second, to attempt to insure the outcomes previously set out in this paper (pp. 25-27). Meshing the writer's personal agenda with the notion of shared decision making, at this stage, necessitated a delicate leadership balancing act as chairperson.

* The work of the committee was now ready to take

on the form of a written plan. With the writer serving as a guide, the committee, working as a whole, developed a format for the written version of the plan. The committee agreed, that for this phase of the project, it was not necessary to "reinvent the wheel", and developed a model which included components most frequently found in similar plans. The following items were finalized as constituting the comprehensive computer technology plan:

- a cover sheet identifying the project
- a table of contents listing the subject matter of the plan
- a background section depicting the original goal of the committee and the process utilized in achieving the goal, as well as the make-up and structure of the committee
- a rationale explaining the need for a strategic technology plan
- a philosophy statement which would not only describe the philosophy upon which the recommendations of the committee were based, but additionally, serve as a guide for future technology curriculum development within the school district
- a discussion of the needs assessment process and

the data that was collected and subsequently analysed

- a description of the sixteen problems which had been identified, along with an analysis of the problem, a recommendation for dealing with the problem, and a discussion of the resulting benefit
- and finally, the plan would include a recommended implementation procedure, advising the school district directors how they might proceed in realizing the committee's recommendations

As for actual drafting on the plan itself, the writer assumed the bulk of the actual writing process and penned the rationale, philosophy, problem identification, and implementation sections. The cover sheet, background section, needs assessment report, as well as the several flow charts included in the report, were produced by various committee members. After several "mark-up" sessions with the entire committee, the rough draft version was organized into a final written product. Although not a requirement binding the committee, each individual section of the plan received a unanimous consensus approval of the committee.

* The completed comprehensive computer technology plan (see Appendix G) was then submitted, by the writer as chairperson, to the Superintendent of Schools for acceptance by the school district board of directors. The comprehensive computer technology plan was presented by the Superintendent of Schools at an official school district director's meeting and was subsequently accepted by the directors. Lastly, the committee was officially discharged.

* Following acceptance, the plan was made available for dissemination throughout the school district. This was accomplished through the use of "in-house" mail within the school and by general distribution at the school district's administrative office.

Chapter V

Results, Discussion and Dissemination

The problem in this particular work setting was that although computers were available, there was no plan existing in the school district to establish how computer technology was to be used. The reason was primarily because of the ad hoc fashion by which computer technology had entered the curriculum and then continued to spread. The solution selected, utilized a committee, structured on a shared decision making model, representative of all parties with a vested interest, as a vehicle through which the undesirable situation was reversed through the development of a comprehensive computer technology plan.

Results

The single goal of this practicum was that the school district would develop a long-range comprehensive computer technology plan. Several specific outcomes

were established in conjunction with the overall goal. Implementation of the practicum project would be considered a success if a mechanism for each of the stated outcomes was contained in the comprehensive plan. The practicum success was as follows:

* Outcome - A class-to-class formal observation will reveal that all teachers have been supplied with a computer, and are utilizing same for non-instructional components of their job.

* Result - The plan recommendation was that each teacher be furnished with a computer. Furthermore, it was recommended that these computers be located on each individual teacher's desk and that the computers be networked together.

* Analysis - It is the writer's belief that this outcome is the key component to the future success of implementing this plan. The literature strongly supports this notion. Furthermore, the committee shared a similar sentiment and, from the onset, agreed that staff support and the idea of teacher "technology buy-in" was fundamental.

* Outcome - A class-to-class formal observation will reveal that all classrooms are equipped with a

minimum of one computer for instructional purposes, and that computer technology is utilized and encouraged in all appropriate programs.

* Result - The plan recommendation was that, at a minimum, one computer be available in each classroom for student use. Additionally, the plan stated that computers should be used across the curriculum by all teachers.

* Analysis - Initially the committee debated the question as to whether computer equipment was justified in each classroom setting, or, whether such equipment should not be in a common "lab" location. The consensus was, that at the present time, as well as the near future, both situations were appropriate, that is, a minimum of one computer in each room for student use as well as a "computer lab". The long-range scenario, however, was that computers would become so commonplace in the individual classroom that the need for a lab would disappear. Once again, as in the previous outcome, staff support and training was viewed as being the key ingredient in accomplishing the transition.

* Outcome - A formal review of teacher lesson plans and student enrollment records will substantiate that all elementary students are receiving a minimum of

one hour per week of computer instruction, and all secondary students a minimum of one-half hour per day of hands-on computer time.

* Result - The plan recommendation was that computer technology be integrated into all grade levels, kindergarten through twelfth grade. In addition, the plan stated that all academic disciplines should integrate computer technology where feasible. The planners chose not to make a recommendation for a minimum amount of time for student computer interaction.

* Analysis - The question as to the proper developmental stage or age at which computer should enter the curriculum was the most arbitrary and subjective of the issues explored. The literature did not always agree. The existing computer plans reviewed produced differing entry levels for the introduction of computer education. The schools visited by the committee were using a variety of models ranging from kindergarten to high school as the appropriate introductory grade level. Lastly, the professionals interviewed and utilized as resource people for this project were not in agreement. The evidence was slanted, however, and leaned toward a K-12 computer program. The committee decided likewise for this

particular setting, a kindergarten through twelfth grade computer program.

* Outcome - A review of written curriculum will indicate that wherever feasible and appropriate, computer technology has been integrated as an instructional strategy, across the curriculum.

* Result - The plan recommendation was that computers should be used across the curriculum by all teachers. It was further stated by the planners that secondary industrial arts, social studies, science, and English should be priority disciplines in this consideration.

Analysis - As indicated in the literature review, there was ample evidence to suggest that computer technology could be successfully integrated into all disciplines. The committee never labored with this concept but did feel that certain areas - those listed above - should be prioritized as immediate candidates for computer curriculum integration.

* Outcome - A review of graduating student transcripts will indicate that all graduates have participated in classes which expose the student to the computer skill of keyboarding, as well as the computer

applications of word processing and telecommunications.

* Result - The plan recommendation was that keyboarding would be a skill required of all students. The planners further suggested that keyboarding begin at the middle school level and then be ongoing through the remainder of the student's academic career. The planners noted, through a flow chart diagram, that word processing and telecommunications were to be components of the student's experience using computers as a tool to extend their capability.

* Analysis - The committee readily agreed that keyboarding was a requisite skill of all computer users. As in one of the previously stated outcomes, the question arose as to the proper developmental stage at which keyboarding could begin. At what grade level did the students possess both the cognitive and motor skills to readily acquire this skill? Based mostly on discussions conducted with practicing professional keyboarding teachers, the committee came to agreement that the fifth grade level was the optimum entry point for keyboarding. The rationale for this decision was that this was probably the earliest age at which the motor skills were fully present for keyboarding and, by starting at this point, students would have the capacity to keyboard throughout the middle school and

high school years.

As to the questions of word processing and telecommunications, the committee followed the lead of other models and included these computer experiences in a list of computer "tool" applications which whould be available to students. There was little debate or discussion over this point.

* Outcome - A review of staff-development attendance records will substantiate that all teachers have participated in a computer staff development program, at their individual level of proficiency.

* Result - The plan recommendation was that all teachers should be given the necessary training to become proficient with the computer. Planners suggested that from the onset of implementation, a strong staff development commitment, in the form of dollars and faculty release time, was necessary.

* Analysis - Contemporary literature decries the fact that lack of staff development is the major contributing factor wherever the implementation of computer technology plans have failed. Discussions held between committee members and computer coordinators or school administrators of other school districts produced a similar message. Staff

development is vital in successfully implementing a computer technology plan! Much debate ensued over the "dollars and cents" reality surrounding the staff development question. In truth, it is much easier to raise funds for hardware or software than for teacher training.

Research conducted by the committee indicated that two models were prevalent for computer staff development training. The first involved bringing into the school district, professional technology trainers to provide staff development. The second allows for the sending of a few individuals from within the school district to receive training, and then those few return and become "in-house" trainers. For a variety of reasons, including level of expertise of several existing staff members, size of the school district, and geographic isolation of the school district, the committee recommended the later of the two models, feeling that it would be wise to have one-or-more experts in-house and therefore available on an ongoing basis.

* Outcome - A review of the computer education written curriculum will show that "computer literacy" has been defined in accordance with the state mandate.

* Result - The plan recommendation was that the computer literacy design be updated in accordance with the state mandate and thereafter, undergo periodic revision.

* Analysis - There was little debate amongst the committee members as to the necessity of this item. Although the committee uncovered that a computer literacy plan had been previously developed and subsequently filed with the Department of Education, it was unanimously agreed that this existing eight year old was out-of-date.

* Additional Analysis - Although the outcomes listed above were the specified objectives of this practicum project they were not the sole results. Research conducted by the committee led to the inclusion of at least eight additional considerations of which the committee felt compelled to offer a recommendation. Appendix G offers a thorough description of each recommendation, but briefly stated the additions were as follows:

* Software - Through the needs assessment process and the involvement of regional businesses and industry, the committee concluded that, where practical, software applications in the classroom

should correspond to those types in use in the work place. As one example, the current word processing software utilized by the school district does not offer the feature of "what you see is what you get" (WYSIWIG). The group acknowledged that although there exists countless thousands of software programs, there are several particular models which dominate. In brief, the consensus was, that software programs in the school should reflect those of the regional work place.

* Hardware - The question of hardware platforms was the most arduous question to face the committee. Months of discussions and debates coupled with consulting educational and technology professionals led the committee to form a recommendation similar to that of the software component, which stated that future hardware purchases should reflect general business and industry compatibility. In short, the committee concluded that new hardware should be a mix of IBM or compatible models along with Macintosh.

* Library-Media Services - Never a point of contention, the committee called on future curriculum and budget planners to upgrade electronic library-media services. Specifically, the committee recommended that CD-rom type data bases be installed in the library.

* Networking - After visiting several school

systems which had networked teacher's computers for administrative functions, several committee members advocated strongly for a similar approach in this particular setting. Countless uses for a network system including in-house electronic mail, morning announcements, and attendance, to name a few, were devised. The conclusion was that such a system would improve both productivity and accountability.

* Community Relations - The benefits of a shared decision making committee model were extremely evident in addressing this particular topic. Committee members, particularly those from the general public, offered much insight into forming a recommendation as to how the community and the school district might form a partnership in the technology education endeavor. Evidence collected and reviewed by the committee indicated that, more-and-more, technology was becoming an integral part of the local work place. An alliance between the school district and the community could provide real-world technology scenarios where the student could observe and/or experience practical computer applications. Additionally, the curriculum could better serve the needs of the local community.

* Financing - The academic year in which this practicum project took place (1992/93) was undoubtedly

the most devastating budgetary year in this state's history. The question constantly plagued the committee, "In reality, can the school district fund what we are recommending"? The committee decided to make a funding model as an individual recommendation contained in the plan. In realizing that there existed reasonable limits to which the local budget could be taxed for technology education, the committee recommended that the school district seek out alternate sources of funding through grants and through the partnership with business and industry.

* Physical Plant Requirements - Briefly stated, the school building would not accommodate many of the recommendations made by the committee due to space limitations and the load on the existing wiring system. The committee's recommendation called for a reallocation of space within the building to facilitate an infusion of computer technology equipment and rewiring where appropriate. The committee cautioned their predecessors who would implement the technology plan, that this particular step should be "well-planned" and "well-thought-out" to maximize the benefits.

* Computer Coordinator - Because of the ad hoc fashion in which previous computer efforts had been

coordinated, the committee felt it vital to address the topic directly, as an individual component of the computer plan recommendations. The committee was unanimous on this point and suggested that a permanent computer coordinator position be created.

Discussion

The findings of the above summary clearly indicate that the goal and outcomes of this practicum were met with one very minor exception. The lone exception was that the planners chose not to mandate a minimum time, daily or weekly, for student computer interaction. It is the belief of this writer that the committee may have felt that such a mandate properly belonged within the realm of curriculum development and not as a function of long-range planning. Nonetheless, the implementation resulted in the development of a long-range comprehensive computer technology plan, addressing all other stated outcomes and is therefore considered to be successful.

In addition to the accomplishment of the stated outcomes listed at the onset, numerous additional outcomes were realized in the finished plan. At least eight additional recommendations targeting software, hardware, library-media services, networking, community

relations, financing, physical plant requirements, and the creation of a professional computer coordinator position were added.

Another unanticipated event was the writer's successful submission of two grants, which allowed for the purchase of two computer models currently not available within the school district. These two units represented the two platforms most commonly used in education today, and provided committee members, students, staff, and community an opportunity for hands-on experience and software review.

A final unexpected outcome, and perhaps the most significant realized through this practicum project, at least from the writer's perspective, was the far reaching advantage of the shared decision making committee model. The expertise of the various committee members, coupled with their diverse vantage points, often established extensive and comprehensive debate, which ultimately yielded a unanimous consensus amongst the committee, on any given issue-at-hand. Additionally, SDM adds validity and credence to the entire process and makes acceptance of the final product an easier task. While the writer never doubted the credibility of the SDM model as portrayed in the literature, SDM's merits exceeded expectation. The

writer strongly advocates that this model was not only valid in this particular setting, but would produce similar results in any analogous situation.

In summary, the implications gleaned by this practicum are indisputable. First, the development of a long-range comprehensive computer technology plan is fundamental to the provision of computer technology education. Lastly, employing a shared decision making committee is an effectual strategy for accomplishment of the aforementioned task.

Recommendations

To those practitioners who might be considering implementing a similar practicum in the future, the writer proposes the following recommendations:

* Insure that all constituencies with a vested interest are included in the planning process, however, keep the committee size to a manageable number. Based on this particular experience, the writer would recommend nine or ten as a workable number for an effort such as the one-at-hand.

* Select committee representatives who have both a knowledge and an interest in the issue-at-hand. While educating committee members might be a necessary part of the process from time-to-time, insure that too much

of the committee's valuable time is not consumed with this activity.

* Plan time management well. At the onset, develop a reasonable time line for the various phases of the committee's function, and then adhere to the schedule.

* Don't attempt to "reinvent the wheel" if its not necessary. Have the prior successful work of others available for committee reference and use it when appropriate. The writer, as chairperson, often disseminated reference material to committee members via a semimonthly mailing in an attempt to facilitate progress at the subsequent committee meeting.

* Use computer technology in developing, producing, and presenting the final product. Graphics along with charts and graphs can enhance the written text and appearance of the finished report. The writer additionally used a computer presentation program to make the final oral presentation to the school district directors. The directors were visually provided with information on a computer screen, as the oral presentation ensued.

Dissemination

Although there exists a large body of contemporary

literature on the various aspects of computer technology in education, there is a relatively small body of knowledge, in print, on the topic of this practicum. Therefore, dissemination is requisite. The writer plans the following strategy for disseminating the results this practicum:

* The writer plans to submit a proposal for presentation of this report to a national conference on technology education, held annually in the writer's home-state.

* The writer will prepare a synopsis of this project to be submitted to an educational journal for publication consideration.

* The writer anticipates presenting an oral overview of the project to available forums of interested parties including educator workshops, educational technology groups, subject area conventions, school administrator conventions, etc.

* The writer will seek to have this report published electronically in the Educational Resources Information Center (ERIC) collection.

* A short synopsis of this project along with a copy of the comprehensive computer technology plan will be placed on file in the state department of education computer consultant's office.

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Appendix A

Formative Evaluation Checklist

Formative Evaluation Checklist - Date: _____

* Outcome #1

A class-to-class formal observation will reveal that all teachers have been supplied with a computer, and are utilizing same for non-instructional components of their job.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #2

A class-to-class formal observation will reveal that all classrooms are equipped with a minimum of one computer for instructional purposes, and that computer technology is utilized and encouraged in all appropriate programs.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #3

A formal review of teacher lesson plans and student enrollment records will substantiate that all elementary students are receiving a minimum of one hour per week of computer instruction, and all secondary students a minimum of one-half hour per day of hands-on computer time.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #4

A review of written curriculum will indicate that wherever feasible and appropriate, computer technology has been integrated as a curricular, instructional strategy.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #5

A review of graduating student transcripts will indicate that all graduates have participated in classes which expose the student to the computer skill of keyboarding, as well as the computer applications of word processing and telecommunications.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #6

A review of staff-development attendance records will substantiate that all teachers have participated in a computer staff development program, at their individual level of proficiency.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Outcome #7

A review of computer written curriculum will show that "computer literacy" has been clearly defined in accordance with the state mandate.

_____ has become a formal part of the plan

_____ is currently under discussion

_____ has not yet come under discussion

_____ has been eliminated from any further discussion

Comments:

* Unanticipated Outcomes:

Appendix B

Summative Evaluation Checklist

Summative Evaluation Checklist

* Outcome #1

A class-to-class formal observation will reveal that all teachers have been supplied with a computer, and are utilizing same for non-instructional components of their job.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #2

A class-to-class formal observation will reveal that all classrooms are equipped with a minimum of one computer for instructional purposes, and that computer technology is utilized and encouraged in all appropriate programs.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #3

A formal review of teacher lesson plans and student enrollment records will substantiate that all elementary students are receiving a minimum of one hour per week of computer instruction, and all secondary students a minimum of one-half hour per day of hands-on computer time.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #4

A review of written curriculum will indicate that wherever feasible and appropriate, computer technology has been integrated as a curricular, instructional strategy.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #5

A review of graduating student transcripts will indicate that all graduates have participated in classes which expose the student to the computer skill of keyboarding, as well as the computer applications of word processing and telecommunications.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #6

A review of staff-development attendance records will substantiate that all teachers have participated in a computer staff development program, at their individual level of proficiency.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Outcome #7

A review of computer written curriculum will show that "computer literacy" has been clearly defined in accordance with the state mandate.

_____ outcome implemented into plan

_____ outcome implemented into plan with modifications

_____ outcome deleted from plan

Remarks:

* Unanticipated Outcomes:

Appendix C

TIME LINE

Computer Committee

Suggested Time Line

1. Month 1: Organization - Organizational functions of the committee will be executed.
2. Month 2: Needs - Needs assessment will be developed and implemented.
3. Month 3: Fact finding - results of needs assessment will be analysed.
4. Month 4: Problem finding - A problem statement will be developed.
5. Month 5: Idea finding - alternatives and potential approaches will be discussed.
6. Month 6: Solution finding - goals and objectives for the plan will be generated.
7. Month 7: Engrossment - The plan will be drafted into a final written form.
8. Month 8: Dissemination - Comprehensive Technology Plan will be formally presented to the district directors and after approval disseminated.

BEST COPY AVAILABLE

Appendix D

FACULTY SURVEY

To K-12 teachers:

In order to best meet the current and future needs of Forest Hills students, a committee has been formed to determine not only what we should teach in computers but to make recommendations for future computer purchases. It is very important that all staff take the time to complete this questionnaire and feel free to add all additional comments. Please return to Marlene Stowell, Paul Nodine, or Bill Crumley (or put in mailbox). Please return within 10 days.

Please circle your current level:

Elementary School (K-4)
Middle School (5-8)
High School (9-12)
Other (K-12 teacher, aide, support staff)

Please indicate your response on this section according to the following classification:

1 Strongly Agree
2 Agree
3 Not Sure
4 Disagree
5 Strongly Disagree

In general I feel comfortable using computers ___

I am a proficient typist ___

I currently use a computer to help with clerical work (grading, record keeping, tests, etc.) ___

I feel a computer is useful as a teaching tool in my subject area ___

I currently use a computer as a teaching aid ___

S.A.D. 12 currently has the proper software (programs) to meet student/teacher needs ___

S.A.D. 12 currently has the proper hardware (computers, accessories) to meet student/teacher needs ___

I am familiar with a word processing program ___

I am familiar with a data base program ___

I am familiar with a spreadsheet program ___

Teachers should be required to take a basic computer literacy course ___

A teacher's workshop on computer use would be beneficial ___

All teachers should be provided with a personal computer for home and/or classroom use ___

My students have unlimited access to a computer ___

I feel there are enough computers in my classroom/ wing to meet current student needs ___

If more computers were available in my classroom/ wing my students would benefit ___

Most of the students in my classroom/wing are familiar with proper software care and handling ___

Most of the students in my classroom/wing are familiar with proper start up and shut down ___

Please take the time to answer the following questions. Feel free to write on the back if necessary.

1. How would you define "computer literacy"?

2. At what level (elementary, middle, high school) would you like to see keyboarding introduced?

3. At what level would you like to see a computer class introduced?

4. Is there a particular brand or model of computer that you would like to see S.A.D. 12 invest in? Why?

5. Are there any particular accessories that you would like to see S.A.D. 12 invest in to upgrade its current systems?

6. What computer programs would you like to see S.A.D. 12 invest in to benefit students in your class or wing?

7. What aspect(s) of computer use should be taught? Please list in order of importance.

8. If unlimited staff development was provided by S.A.D. 12 would you be willing to integrate computers into your subject area?

9. Do the students in your classroom/wing use computers primarily for schoolwork, for games, or both?

10. Should a K-12 computer curriculum be established at S.A.D. 12 with specific objectives for each

11. Do you have any other concerns, comments, etc. on current or future computer curriculum, purchases, etc.?

Appendix E

ALUMNI SURVEY

Dear Forest Hills Alumni and Alumnae,

As part of an overall commitment to prepare our students for the post-FHHS world, a computer committee was recently formed at Forest Hills. The purpose of this committee is to examine our computer courses, identify any strengths and weaknesses, and make suggestions for changes if needed. As a past graduate, you are crucial to our endeavor since you are the individuals who have already entered a post-secondary institution or work force. Would you please take a few moments to complete this survey and return it to us? It is greatly appreciated.

1. What year did you graduate from FHHS? _____

2. How many years did you attend FHHS? _____

3. Please list computer courses you had at FHHS.

4. Did you attend a post-secondary institution _____ or enter the workforce _____ upon graduation? (If you attended college please answer questions 5 through 8 below. If you entered the workforce please answer questions 9 through 12 below. If you completed post-secondary schooling and have since entered the work force, please complete questions 5 through 12.)

5. Were you required to take additional computer courses or use computers in your assignments?

6. Do you feel that the computer education you received at FHHS adequately prepared you for your post-secondary career?

7. If not, what other type of computer skills do you feel would have been helpful?

8. What changes, if any, do you feel FHHS should make to help students going on to post-secondary schools to be more computer literate?

9. What computer skills, if any, were required for your job?

10. Were you adequately prepared to use the computers at your job?

11. If not, what type of additional training do you feel would have been helpful?

12. What changes, if any, do you feel FHHS should make to help students entering the work force to be more computer literate?

13. Have you ever been refused college entry or a job (or chosen not to apply) because of a lack of computer skills?_____
If yes, please explain.

If we may contact you for additional assistance, please furnish your name, address and telephone number below.

THANK YOU FOR YOUR VALUABLE ASSISTANCE.

Appendix F

POTENTIAL EMPLOYERS OF SCHOOL DISTRICT GRADUATES SURVEY

QUESTIONNAIRE FOR POTENTIAL EMPLOYERS OF FHHS GRADUATES

Forest Hills School system in Jackman is currently updating their computer curriculum. The expectations of future employers and post secondary educational institutions will be considered as part of this process.

Name of business (optional) _____

Type of business _____

Number of employees _____

What % of your employees use computers? _____

What positions are available in your organization at entry level for a high school graduate? _____

_____

_____

_____

What kind of computer background should a high school graduate possess? _____

_____

_____

_____

_____

What should the schools be teaching in their computer program? _____

_____

_____

_____

_____

What type of computer system (hardware) does your company use?

___ Apple (MacIntosh, IIe, etc.)
___ IBM or IBM compatible
___ Mainframe or network connection
___ Other (please specify) _____
___ None

What software packages do you use? _____

_____

_____

_____

Thank you for taking the time to fill out this questionnaire. Your response will be valuable as we evaluate our program. Please return to:

Paul Robbins
Business Education
Forest Hills High School
Jackman, ME 04945

PLEASE RETURN WITHIN 10 DAYS OF RECEIPT

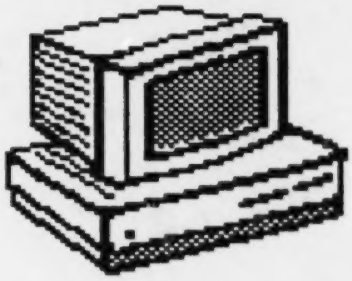
Appendix G

COMPREHENSIVE COMPUTER TECHNOLOGY PLAN

M.S.A.D. #12

Jackman, ME 04945

COMPREHENSIVE COMPUTER TECHNOLOGY PLAN



"If you don't know where you're going, any road will get you there."

Ancient Chinese Proverb

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JUNE 1993

Background

GOAL

The goal of the Computer Technology Committee was to provide a path forward for M.S.A.D. #12's computer technology program. Our vision as a committee was that this plan would serve as the first step of a continuing process to meet the needs of the students who will face the rapidly changing technological global community. The philosophy of how we view computer technology and its role in the curriculum is stated in Chapter III of this plan; it emphasizes academic excellence, the success of individual students, and computer technology's role in meeting the challenges facing each student.

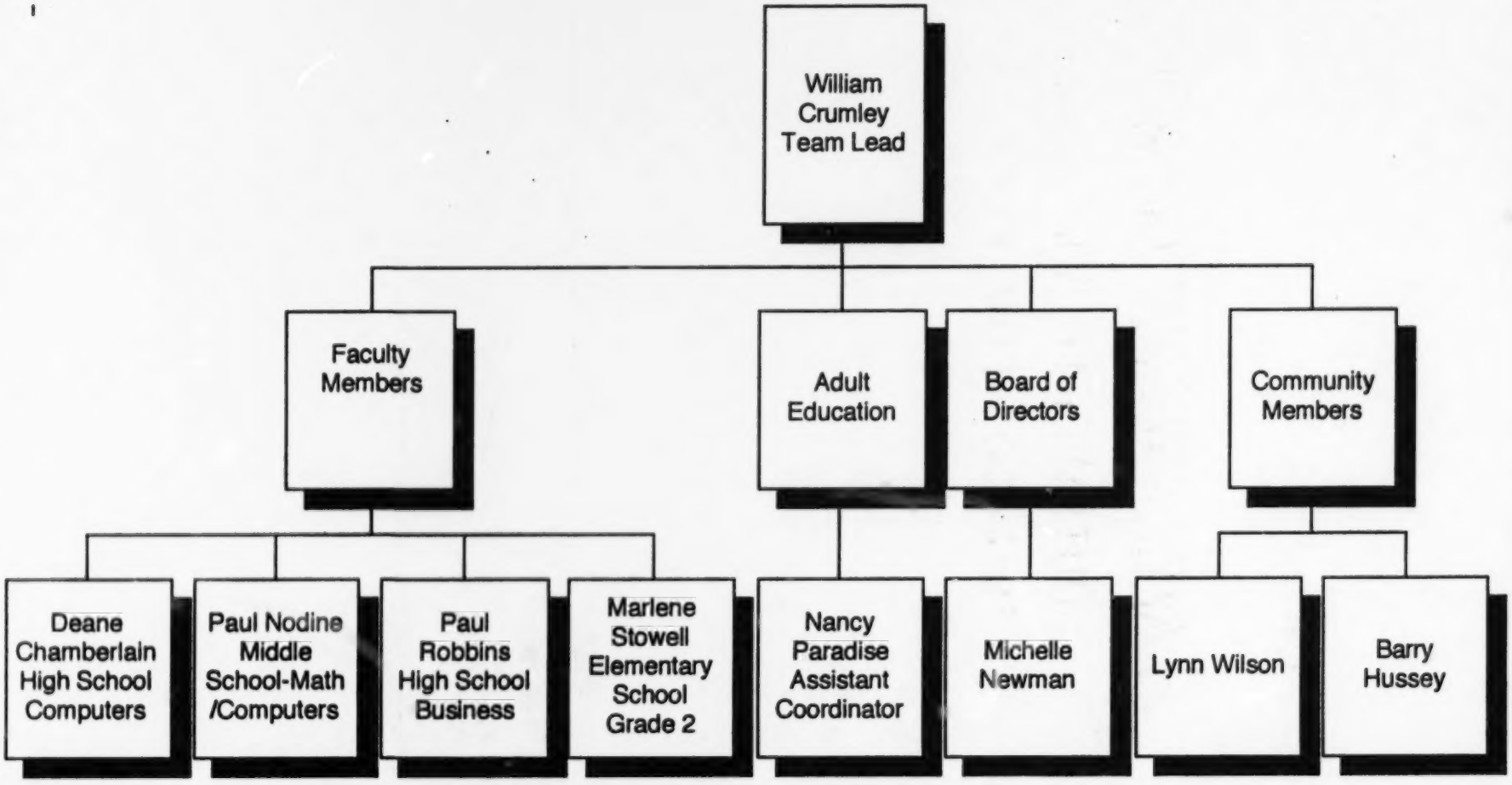
The process that the group went through to identify problems and provide recommendations used input from the local community through surveys of businesses as well as the two community members serving on the committee. Forest Hills' graduates were also surveyed to determine what they have encountered since graduation. The third survey gathered data and recommendations from the Forest Hills School staff.

It is important to recognize that the recommendations made by the committee require involvement from the faculty, school board, students, community, and other outside resources to be successful. In these socially, economically, and technologically challenging times it will take a concerted effort to implement a plan of action.

People with goals succeed because they know where they are going.

Earl Nightingale

COMPUTER COMMITTEE



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Rationale

Rationale

"[O]ur youngsters need more access to computers in school if they are to be ready for the challenges of the adult world. Computer-related technology should be a fundamental instrument in the curriculum, not an extra."

Maine's Common Core of Learning

"No longer is it enough just to read and write. In a world where information comes in many forms - text, audio, video - and where the amount of information is increasing at exponentially staggering rates, the literacy skills of the last 20 centuries will not take our students into the next one."

A quote from Beyond the Three Rs

In his book, The Saber-Tooth Curriculum, author Harold Benjamin satirically questions curriculum and instruction. The writer depicts a fictional pre-historic society which has an abundance of education taking place, but unfortunately may be doomed to extinction because the curriculum in use is not relevant to the present or future of the stone-age student inhabitants. Analogous to the opening quote from Maine's Common Core of Learning, the students of Benjamin's curriculum farce are not "ready for the challenges of the adult world". Instead they have been instructed to live in a world long gone.

Events of the past few decades, including the orbiting of space satellites and the development of micro-chip technology, have brought more rapid change to the way we live than all of the decades of human history combined. Education too must accordingly change. As our education system was transformed a century ago, when our nation passed from an agrarian society to an industrial society, we must again, one-hundred years later, transform. Our newfound mission is to prepare our students not for the industrial age of the twentieth century but the information/technology age of the new millennia.

Basic literacy too is being redefined. No longer will reading, writing, and arithmetic be the sole criteria for defining literacy. A literate citizen in the twenty-first century will not only need these prerequisite three R skills but more importantly the ability to access, retrieve, and manipulate data. In short, computer literacy. The literacy cliche murmured in 2001 is likely not to be "Johnny can't read" but instead, "Johnny can't use the computer".

The rationale for development of a comprehensive computer technology plan is demonstrated by the two opening quotes of this section. Perhaps too often our curriculum is centered around what was good or what worked in the past. The stone-age students in Benjamin's tale were receiving a wonderful education from the best teachers in-the-land, on how to hunt and kill the saber-tooth tiger. Unfortunately and unbeknownst to the students, the saber-tooth tiger had been extinct for years!

If our goal is to develop students who will be able to function effectively and be productive citizens in the next century, then a strategic technology plan is a first and necessary step in that process.

References

Benjamin, H. (1972). The Saber-Tooth Curriculum (memorial edition). McGraw-Hill, New York.

Hill, M. (1992). Beyond the three Rs. Electronic Learning. 12(1), 28-33.

Maine's Common Core of Learning: An Investment in Maine's Future. (1990). Commission on Maine's Common Core of Learning. Augusta, ME.

Philosophy

Philosophy

"[P]repare the youth of the community for a useful and meaningful future by taking each student where he or she may be and developing each to his or her fullest potential."

A Quote from M.S.A.D. 12 Educational Philosophy

"Each child is the class."

Abraham S. Fischler, Nova University

The purpose of computer technology education is to develop responsible, effective, literate citizens who are active participants in a rapidly expanding and rapidly changing technological global community.

We encourage academic excellence. In keeping with the M.S.A.D. 12 district philosophy statement, we realize and accept that each individual student has unique developmental needs. Hence, we perceive our school as a learning environment in which each individual can grow.

We view computer technology education as a threefold mission:

* Teaching and learning about computers. Computer technology is the subject of the instruction.
* Teaching and learning with computers. Computer technology supports instruction across the curriculum.
* Teaching and learning using computers. The computer becomes a tool in the hands of the student.

We additionally view student mastery as being threefold:

* Literacy. All students will achieve a basic literacy level.
* Competency. Some students will develop a competency level with particular computer applications.
* Expertise. A few students will achieve a level of expertise with particular computer applications.

We believe that a successful school celebrates the success of each student.

COMPUTER TECHNOLOGY
IN THE FOREST HILLS SCHOOL
K-12 CURRICULUM

Teaching/Learning
ABOUT
Computers

---

literacy/competency/
proficiency

programming

keyboarding

history

social impact

The computer is the subject of instruction.

Teaching/Learning
WITH
Computers

---

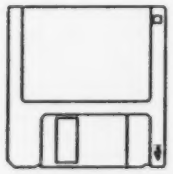
drill & practice

tutorials

simulations

problem-solving

(computer assisted instruction)



Computer software supports instruction in content and subject areas.

Teaching/Learning
USING
Computers

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literacy/competency/
proficiency

word processors

data bases

spreadsheets

telecommunications

CD-ROM
plotters
etc.

The computer is a tool which extends our capabilities.

Needs Assessment Results

FOREST HILLS SCHOOL STAFF QUESTIONNAIRE

The purpose of this survey was to establish the comfort level of present staff regarding computer use, and specifically how computers are used in the classroom. Also, input and recommendations for future hardware and software purchases were sought. Finally, teacher attitudes toward staff development are presented. Twenty-two responses were collected from the Forest Hills teachers and support staff.

Most of the staff (59%) felt comfortable using computers. The same percentage felt they were proficient typists. The majority of those responding (73%) were familiar with a word processing program, but only 45% were familiar with a data base program and 22% with a spreadsheet program. Many definitions of "computer literacy" were presented, ranging from general use and care of equipment to knowledge of terminology and history in order to use the computer to its fullest potential.

Only 36% of the staff currently use computers for grading and/or testing, and 41% use it as a teaching aid in the classroom. Most respondents felt that computer use should be integrated into the curriculum as a teaching tool rather than something taught in isolation. Only 14% of the staff felt students are currently unfamiliar with software care and handling. 45% thought students were familiar with proper start up and shutdown and 55% were not sure. Currently, 53% of the respondents felt that computers are mainly used for schoolwork and games and 41% felt schoolwork was the primary use. This is obviously grade dependent, as high school students may use the computer exclusively for schoolwork while younger children may primarily be exposed to games and user friendly software. More than half of the staff (55%) felt that keyboarding should be introduced in elementary school, while 40% felt middle school more appropriate. The same percentage (55%) felt a computer course should begin in middle school, while 40% opted for the elementary grades.

The majority of the staff had questions about having the proper hardware and software to meet student needs. 64% felt that Forest Hills lacked the proper equipment to meet current student/teacher needs, while 27% were not sure. 36% felt that the school lacked software, although 50% were not sure. Generally, the staff indicated that students should have more access to computers. Only 27% felt their students have unlimited access currently. Only 14% thought there was a sufficient number of computers in their classroom or wing to meet current student needs, and 77% felt that the students would benefit from having more and different hardware. In terms of specific recommendations, the staff felt that Apple computers were easiest to use, most effective and versatile for elementary and middle school applications, with Macintosh

a desirable upgrade. Many recommended IBM or compatible for high school use, especially for business applications and felt that diversity in hardware and software packages would benefit the most students. Staff recommended additional CD-ROM and reference material, business oriented material, and course specific software. The staff was unsure of both what is available to students at present and what software could meet their future needs in the classroom.

The staff felt overwhelmingly (82%) that a teacher workshop in computer use would be beneficial. 77% felt that teachers should be required to take a basic computer literacy course. Most (64%) thought that a K-12 computer curriculum should be established with specific objectives for each level. Every faculty member felt that if unlimited staff development were provided by M.S.A.D. #12, they would integrate computers into their curriculum. Only 4% felt that a teacher should not be provided with a computer for class/personal use. Many concerns were raised, including lack of space and facilities, money for equipment and staff training, and incorporation of the investment into the curriculum. One staff member wrote, "A firm commitment by staff must be a key element of the process with continuous training and follow-up to stay in tune with technologies available and the benefits which might be incorporated into teaching methodologies."

FORMER STUDENT COMPUTER QUESTIONNAIRE

The purpose of the survey was to ask Forest Hills graduates what computer experiences they have encountered since graduation. Specifically, the questionnaire sought to ascertain what skills students did or did not obtain at Forest Hills High School that they needed in college or the workplace to determine whether the high school curriculum reflected the changing needs of future graduates.

Questionnaires were mailed out to all Forest Hills graduates from the five year period from 1987 to 1991. The response was somewhat disappointing as only eleven replies were collected. Ten of those former students spent their entire four years at Forest Hills, and nine took the Introduction to Computer course. Only two did not take any computer class in high school. Ten of the respondents attended a post-secondary institution upon graduation from Forest Hills. At the time of the survey, five of the respondents were students at a college or vocational school and four were employed full time.

The majority (80%) of the respondents were required to take additional computer courses or use computers in their assignments. 55% felt that the computer education they received at Forest Hills did not adequately prepare them for their post-secondary career, although 45% felt they were adequately prepared. None of the respondents had ever been refused college entry or a job because of a lack of computer skills. Most of the former students felt that utilizing different systems, which included exposure to IBM and compatibles, DOS, and business world software would be beneficial. The respondents felt that more experience with word processing software would be helpful as well, and that a keyboarding course should be mandatory for all students. The alumni indicated that the future Forest Hills curriculum should emphasize these specifics to better prepare students for the future, whether it be in continuing education or the workplace.

QUESTIONNAIRE FOR POTENTIAL EMPLOYERS OF FOREST HILLS HIGH SCHOOL GRADUATES

The purpose of this survey was to better understand the expectations of possible employers of Forest Hills graduates, specifically with regard to use and knowledge of computers.

There were 35 replies from 70 mailings for a 50% success rate. Of the responses, 29% were from manufacturing firms, 33% were from offices, hospitals and education facilities, 9% were from government agencies, and 6% were from the insurance field. The remaining 23% of the replies came from miscellaneous sources. Most (45%) of the respondents were fairly large businesses, employing over 200 people. 27% of the respondents were quite small, employing between 0 and 50 people. 16% employed between 50 and 100 people, and 6% each employed between 100-150 and 150-200 people.

The most common entry level positions available to high school graduates at present include clerk (12 responses), typist/data entry (10 responses), clerical (7 responses), secretary/receptionist (6 responses), and machine operator (5 responses).

When asked, "What percent of your employees use computers?", twelve companies responded that between 75 and 100% of their workers use them. Nine businesses responded that between 0 and 10% of their employees currently use computers in their jobs. Seven replied that between 25 and 50% of their staff use them, and five felt that between 10 and 25% of their workers use computers. It is obvious that computers will be used by a substantial percentage of Forest Hills graduates in the future.

The survey went on to inquire about what specific types of computer systems and software packages were used by the respondents. The vast majority (25 responses) used IBM or compatible hardware. Many companies (20 responses) said that their employees worked off a mainframe or network. There is a big jump down to Apple or Macintosh use with only five business currently using those brands.

Finally, the questionnaire attempted to find out what specific computer related skills employers were looking for in high school graduates. Generally, employers felt that outside of basic knowledge (i.e. start up, shutdown, etc.), certain computer skills were in demand. Word processing was a specific skill mentioned by a majority (19) of the respondents. Familiarity with spreadsheet (17) and data base (12) programs were other recommendations. Keyboarding was a skill frequently (7 responses) mentioned. The employers felt that schools should be teaching these skills to prepare students for the workplace.

Problem Identification

PROBLEM #1: More hardware is needed throughout the school.

ANALYSIS: Most of the existing computers are concentrated in the high school wing. Within this wing, the computer equipment is further concentrated in two particular rooms, the math room and the business room, where most computer activity currently occurs. Several of the existing computer units are on moveable tables and can be relocated during the class periods when they are not used by business, mathematics, or computer classes. Typically only one computer unit is located in the elementary wing and one in the middle school.

Additionally, teachers themselves do not have access to a personal computer within their individual classrooms for instructional or classroom management purposes.

RECOMMENDATION: The amount of hardware within the school needs to be increased, particularly at the elementary and middle school levels.

Hardware at the high school level should be available to all programs including industrial technology, science, English, social studies, and others as needed. Additionally, computer hardware at the secondary level should be comparable to the world beyond high school(i.e., IBM compatible, Macintosh, etc.)

Every teacher should be furnished with a computer on his/her own desk. These computers should be networked together (this will be addressed under problem #15).

BENEFITS: Students and staff throughout the school will have equal access to computer technology.

Computers will become an educational tool in the hands of both students and instructors.

Computers will enhance the non-instructional components of teaching.

PROBLEM #2: Library-media technology service is needed.

ANALYSIS: The school library currently owns a "MaineCat" computer system which is a computerized listing of over 3 million volumes located in over 300 Maine libraries. Additionally, through the adult education ITV network, an "URSUS" computer terminal is located in the library and is available for use by K-12 students and faculty. This terminal can link students to all seven of the University of Maine campuses as well as other data bases throughout the state.

RECOMMENDATIONS: Additional CD-Rom type data bases should be added to the library. These new units would allow students and faculty to access periodicals, journals, newspapers, encyclopedias, atlases, and other information currently not available.

BENEFITS: Information currently available only through a lengthy inter-library loan process will be available at the fingertips of students and teachers.

Research projects which are currently not feasible will be realistic academic endeavors.

Students will become familiar with the skill of accessing information from an electronic data base.

PROBLEM #3: Software commonly used in business should be used in the business program.

ANALYSIS: Current business classroom computer software does not reflect real world business applications.

Additionally, the existing hardware in use in the business program will not accommodate the desired software.

RECOMMENDATIONS: While it is obviously not practical to familiarize business students with all business related software, there are software types which are the norm throughout the business community. This software should be utilized in business classes.

Future hardware purchases should reflect compatibility with these software applications.

BENEFITS: Business students who go directly into the labor force, as well as those who pursue further education, will have been exposed to the types of computer applications that they are most likely to encounter.

PROBLEM #4: Technology related staff development is non-existent.

ANALYSIS: With a few very recent exceptions, staff development for computer technology has been nil. Many members of the school faculty and support staff are not familiar with currently available computer equipment and, further, have little understanding of the potential offered by computer technology in the classroom.

All contemporary research on the topic points in the same direction - introduction of computer technology without adequate staff development will yield a disaster. Staff development is perhaps the key component in any long-range computer planning.

RECOMMENDATIONS: From the onset, a strong financial committment to staff development will be necessary. Additionally, release-time or workshop days will need to be delegated exclusively for technology.

As often as possible staff development should be provided by in-house personnel. When appropriate, the district should send local staff members outside for training so that they may then return and become resource people for the balance of the staff.

PROBLEM #5: Keyboarding is not ongoing for all students.

ANALYSIS: Keyboarding, the most basic computer skill, is not a required course. Those students who do take keyboarding in high school can begin at any level, some taking this class in their senior year, despite the fact that the students, in some instances, have been working on computers since their freshman year.

Contemporary research indicates that most students possess all of the cognitive and motor skills to begin keyboarding at the fourth grade level.

RECOMMENDATIONS: Keyboarding should be a required skill of all students. Keyboarding should begin at the middle school level, with the goal being that a student will be able to demonstrate proficiency by the time that he/she arrives at high school.

Once keyboarding begins it must be ongoing throughout the remainder of the student's academic career; therefore, the curriculum scope and sequence must reflect ongoing computer interactions on a regular basis.

Wherever practical, teachers should require students to apply keyboarding skills by insisting on written work which is word processed.

BENEFITS: All students who graduate from Forest Hills School will be proficient keyboarders, a requisite skill for the twenty-first century.

Quality of student work will increase as assignments are keyboarded rather than done in longhand. It has been well documented that students who write on computers become more proficient and more productive.

PROBLEM #6: Curriculum design does not reflect ongoing computer applications at all grade levels.

ANALYSIS: Currently almost all student computer experience takes place at the high school level. Exceptions to this are that occasionally a single computer is moved into an elementary classroom for student use, and a middle school computer introduction course.

At the high school level computer education is random. A student may take the required 1/2 credit course in computer education and never touch a computer again. In addition to the required course an additional 1/2 credit is available in advanced computers as well as a 1 credit keyboarding class.

RECOMMENDATIONS: The computer must be viewed as a tool in the hands of the student and instructor and not simply a subject to teach about. While learning about computers is an important aspect of computer education, computer application is a requisite skill.

Computer education should be a K-12 experience. Kindergarten students should be introduced to computer technology, and from that beginning the scope and sequence of the curriculum must ensure ongoing computer experiences for the student through graduation.

BENEFITS: Computer technology will become ingrained in the educational process.

Computers will innately become a tool at the fingertips of the user and not simply a subject.

The student will be more productive.

Educational outcomes will be enhanced.

Graduates will be better prepared for the future, be it post-secondary education or the work force.

PROBLEM #7: Computers are not accessible at all times.

ANALYSIS: With the current situation of all computers being clustered into two classrooms, access to computers is not always possible. Three factors complicate this situation. First, scheduling - There are times of the day when all computers are in use. Second, space - There currently is no lab space outside of the classroom delegated for computers. Third, hardware - There is simply not enough hardware, particularly at the elementary and middle levels.

RECOMMENDATIONS: Increase the amount of hardware available, particularly at the elementary and middle school locations.

Have some computer terminals available at common locations where they would not interfere with regular classes (e.g., library, guidance office, central office, etc.).

Have a minimum of one computer available in each classroom.

BENEFITS: All staff and students would have equal access to computers.

Consistent expectations for the use of computer technology could be established. Greater student accountability could be established as no student would have the excuse that he/she could not have access to a computer.

Ensuring a proper balance of hardware at all levels is a necessary step in sequential computer skill development.

PROBLEM #8: Computer literacy needs to be redefined.

ANALYSIS: Each school district must have a plan on file with the State Department of Education as to how the district will meet the state minimum computer literacy requirement for graduating students. As to what exactly computer literacy consists of is left to local discretion. M.S.A.D. 12 developed such a plan and submitted it for approval in 1985. It was subsequently approved for implementation.

Since 1985 the plan has not been changed or amended although much has changed in computer technology and computer education over that time period.

RECOMMENDATION: The computer literacy plan should be updated as soon as possible and undergo future revisions on a periodic schedule.

BENEFITS: Student computer literacy demonstration will match computer literacy plan.

State computer education mandate will be fulfilled.

A clear mission understood by all will help to ensure that the mandate is carried out.

PROBLEM #9: Community relationships are not capitalized on, in relation to computer education and computer technology.

ANALYSIS: More and more, computer technology is becoming an integral part of the local workplace. Until very recently the school district has not worked toward establishing any kind of a partnership with the local business community. Such a relationship might serve to foster computer education in the community, as the two parties merge to compliment each other.

RECOMMENDATIONS: Educational strategies must be developed which facilitate student involvement in the workplace, particularly in the realm of job-related computer technology. Examples of such instructional strategies could range from simply touring local businesses, "job shadowing", or actual hands-on workplace experience.

Local business and industry should be utilized as a resource base for the school technology program when appropriate. For example this could mean technical support, hardware support, or financial support.

BENEFITS: Real-world technology scenarios could be observed first-hand by the student.

Technology resources otherwise not available within the confines of the school building could be utilized.

Surplus technology equipment could be loaned or donated to the school district.

Curriculum and instruction could better match the needs of local business and industry.

Anytime that the community can come together in a partnership with the school district everybody wins.

PROBLEM #10: Where is the $$$$$$ money?

ANALYSIS: At a time when state subsidies to education are being reduced and local taxes are being increased, there simply is not enough money available to fund the required hardware and software purchases and provide the requisite staff development.

RECOMMENDATIONS: The school district should continue its present computer reserve funding at present or increased levels.

The school district needs to dramatically increase its committment to staff development.

The administrative branch of the school district needs to explore all relevant grant funding opportunities.

Individual faculty members, who are interested in doing so, need to be instructed in the art of grantsmanship. This would include how to locate potential grant sources, how to write grants, and how to implement grant funding.

Local and regional businesses and industries need to be sought out as potential technology funding partners.

BENEFITS: Budget decisions will be able to be made in concert with the technology plan.

Investments in computer technology and staff development will occur on a scale appropriate for the budget.

PROBLEM #11: All teachers do not have access to computers for non-instructional uses.

ANALYSIS: Most classrooms in the school do not contain a computer which the teacher could use for non-instructional work.

RECOMMENDATIONS: Every teacher should be supplied with a personal computer on his/her desk.

Teachers should be given the necessary staff development to become proficient with the computer.

BENEFITS: Teachers will become more productive.

Classroom management chores (e.g., attendance, grades, schedules and calendars, notes, memos, correspondence, etc.) will be easier to produce and maintain.

Organization will improve.

Once created on a computer, tests, lecture notes, and other repetitive items will be able to be saved and then the data reused or easily changed or manipulated for future classes thus saving valuable time in the future.

The content of volumes of paper can be saved on a single computer disk.

As teachers become more familiar with the computer as a organizational tool, they will better realize the potential computers offer as an instructional aide.

The opportunity for networking will be established.

PROBLEM #12: There is no computer coordinator.

ANALYSIS: Currently no one person is in charge of the computer program. This is probably largely due to the fact that computers or computer education does not have autonomy but has always been adjunct to the math and business programs. The high school math teacher has always been regarded as the resource person for computers, training teachers, answering questions, ordering supplies, cleaning and repairing hardware, etc. This individual has never received any extra time or compensation, however, for these activities in a program which has expanded every year since 1985 and continues to expand.

Additionally no one person is responsible for computer curriculum development, computer integration into other subject areas, budgeting, grant development, or staff development.

In short, computer coordination has occurred in a very ad-hoc fashion with most responsibility falling on the math teacher and some concerns not being delegated at all.

RECOMMENDATIONS: A position of computer coordinator should be established. This individual would be responsible for all computer-related activities.

If the district cannot see its way clear to establish a single coordinator position, then the duties should be delegated to several existing personnel with a stipend attached to the particular function. Under this plan one person might be responsible for maintaining all hardware, another with curriculum development and computer integration, another with researching and writing technology grants, etc.

BENEFITS: Computer education will achieve autonomy.

Computer efforts at all levels will be coordinated.

The school district will be in a better position to capitalize on alternative funding resources.

PROBLEM #13: The physical plant will not accommodate new computer equipment in most cases.

ANALYSIS: The electrical wiring systems in most classrooms would accommodate a single computer or perhaps two; however, most classrooms would require wiring modifications for any large infusion of computers or peripheral equipment.

No phone lines or computer networking cable currently exist in individual classrooms.

RECOMMENDATIONS: Selected sites around the building should be wired with appropriate electric circuits to meet the demands of computer equipment. These locations should be well-planned, well-thought-out areas which will meet immediate and future needs.

Network wiring should be installed. (see problem #15)

Telecommunications modem wiring should be available as a part of the networking system.

A reallocation of space within the building may be desirable in some instances.

BENEFITS: Computers will have the capacity of being accessible at all locations.

Telecommunications capabilities will exist.

PROBLEM #14: Computer applications are not currently used across the curriculum.

ANALYSIS: This concern is not addressing the previously mentioned K-12 computer usage but, instead, is addressing subject area usage. Computers are currently used in computer classes, business classes, and occasionally mathematics classes. For the most part, other disciplines do not include computer technology, either in the hands of the teacher as an instructional vehicle or as a learning tool in the hands of the student.

RECOMMENDATIONS: Computers should be used across the curriculum by all teachers. High school industrial arts, social studies, science, and English should be priorities in this consideration.

BENEFITS: Effective teaching time will be increased.

Student motivation will increase.

Learning outcomes will increase.

The notion of the computer as a tool and not as a subject will be realized.

PROBLEM #15: There are no networks.

ANALYSIS: Because computers currently exist in very few rooms, networking has never been an option.

RECOMMENDATIONS: As soon as every teacher is supplied with a computer, it is recommended that these computers be networked together.

BENEFITS: Paperwork could be reduced.

Teachers could share work over the system.

Messages between the staff could be transferred electronically.

Administrative functions (e.g., morning announcements, attendance, grades, correspondence, etc.) would be handled over the network saving much time on the part of everybody involved.

Productivity would increase.

Accountability increases as permanent records are preserved.

Administrators and teachers can access the system from any location in the world (e.g., the principal can be at a conference in Boston and go on-line and read his messages or send messages to any terminal on the network). Likewise a teacher can be home for the day and still be in direct contact with their classroom or the main office.

PROBLEM #16: Word processing software currently in use is not user friendly.

ANALYSIS: Current software for word processing is not, "what you see is what you get" (WYSIWYG). In other words, what appears on the computer screen is not what will print out on the page. This can become a point of frustration for some computer users.

RECOMMENDATIONS: All future computer hardware purchases should accommodate WYSIWYG software.

Future word processing software purchases should be WYSIWYG.

BENEFITS: Word processing productivity will increase.

Computer user frustration will be decreased.

Recommended Implementation

Implementation

With the acceptance of this comprehensive plan by the M.S.A.D. 12 District Directors, the work of this committee is officially ended and the committee dissolved.

The committee offers the following, as a list of recommendations, to facilitate implementation of the plan:

* that the district directors immediately empower a permanent computer technology committee.

* that the superintendent immediately appoint a computer technology curriculum committee.

* that a revised computer literacy/proficiency plan be developed by the computer technology committee and submitted to the State of Maine Department of Education, by the superintendent, in accordance with the Educational Reform Act found in MRSA 20-A.

* that the district directors revisit the question of technology funding.

* that a computer coordinator be designated.